PATENT SPECIFICATION

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PROVISIONAL SPECIFICATION.

Improvements in and relating to Apparatus for Delivering Measured Quantities by Volumes of Pulverulent and other Solid Materials.

We, ARTHUR SAMUEL LEGG, of the "Pond" Engineering Works, Willett Road, Thornton Heath, Surrey, and ALBERT PRIME, of 70, Lakehall Road, Thornton Heath, Surrey, both subjects of the King of Great Britain and Ireland, do hereby declare the nature of this invention to be as follows:—

The present invention relates to apparatus for measuring and delivering quantities of powder. It is common practice to employ powder delivering apparatus operated from a water delivering and measuring vessel of the tipping or rocking type, lost motion being allowed in the connection between the water delivering apparatus and the powder delivering apparatus, so that the tipping vessel is allowed to acquire sufficient power to operate the powder delivering mechanism In the above described apparatus, the powder is delivered by a rotating disc having bent radial projections, the disc being arranged at the bottom of a tapering canister and the delivery taking place through suitable apertures in the side of the canister. A stirrer to prevent caking of the powder is attached to the disc.

According to the present invention, the delivery apparatus is independent from the stirrer and comprises a sliding door having a measuring pocket therein, adapted to be moved by the tipping vessel so that the measuring pocket normally in register with an aperture in the canister bottom, is brought into register with a delivery orifice, the aperture in the canister bottom being held closed during this movement. A stirrer is provided, driven from the tipping vessel by a pawl and ratchet mechanism or other suitable means, lost motion being provided to allow the tipping vessel to acquire sufficient power before operating the stirrer. Lost motion may also be provided for the same reason in the means for operating the sliding door. The measuring pocket is made adjustable in size, and the sliding door may be operated by a system of arms and rods, or by cam means from the gudgeon of the tipping vessel.

In the preferred form of the invention as at present known to us, the door is of rectangular form and substantial thickness, and is slotted right through to form a measuring pocket. A rod is attached to each end of the door, so that the two rods are co-axial and they work in guides, the door being enclosed in a box fastened below the canister. In the normal position, the measuring pocket registers with an orifice in the bottom of the canister, the lower part of which is preferably conical, while the bottom of the box closes the bottom of the measuring pocket. A crank arm is attached to the gudgeon of the tipping vessel, and a connecting rod joins the crank arm and a cross-bar attached to the door rod. As the crank arm and the connecting rod must be arranged on one side to clear the body of the canister, a second guide rod working in suitable guides is attached to the cross-bar close to the point of attachment of the connecting rod so that twisting action and consequent binding is avoided. When the tipper acts, the door is moved over and the measuring pocket brought into register with a delivery orifice in the bottom of the containing box. Preferably springs are provided on the door rod and guide rod which are compressed at the end of the stroke, thus taking shock, and helping to start the return movement. The body of the door

is extended, or has an extension plate attached to it, so that when the door moves over, the orifice in the canister is kept closed and no powder falls into the containing box. Lost motion may be allowed by slotting the connecting rod so that the movement of the door does not commence till the tipper has moved a short distance. In a machine constructed in accordance with the present invention, such lost motion may be very small, or even omitted, since the door does not work inside the body of the powder and the resistance to its motion is small and fairly constant. The principal resistance is to the stirrer and this may reach a high value when the canister has been standing some time, owing to caking of the powder. The stirrer is mounted on a vertical shaft in the canister. The shaft is turned by bevel gears, the second bevel gear being carried on a horizontal shaft carried in suitable bearings, one end passing through the wall of the canister and carrying a ratchet wheel. This ratchet wheel is operated by a pawl carried on an arm actuated by a crank arm attached to the gudgeon of the tipping vessel. The stroke of the pawl must be greater than the length of the one ratchet tooth but less than the length of two ratchet teeth, the difference in length allowing lost motion so that the tipper acquires sufficient power before operating the stirrer.

The bevel gears are enclosed in a casing to protect them from the powder in the canister. It should be understood that the stirrer can be operated in various other ways if desired.

In a modified construction according to the invention, the door is operated by a cam, arranged to work vertically by means of a crank arm on the gudgeon of the tipping vessel and a connecting rod. The door guide rod abuts the working face or edge of the cam which is inclined to the vertical so that when the cam is operated the door is pushed over. The rod is kept against the cam and the door returned by means of a spring. Lost motion may be provided by suitably shaping the cam.

The measuring pocket is preferably made adjustable, by making its sides parallel, a partition sliding between the sides. The partition is operated by a screw which extends through the guide rod. In the case of the connecting rod operated door, this screw may pass through in either direction as may be convenient, but, in the case of the cam operated door, it must of course pass through the guide rod remote from the cam. In combination with the adjustable measuring pocket there are preferably provided a series of interchangeable cones having various sized orifices, which are placed in the bottom of the canister.

It will be understood that both the above described constructions are for a machine having a single tipper. The door might equally well be operated from a double tipper, for instance, by a double cam, or by having two delivery orifices in the bottom of the containing box on opposite sides of the canister orifice. It will also be understood that one tipper may be adapted to operate two or more doors on separate canisters, such as are used when a number of different powders are to be added to the water, or any other substance or materials.

Finally it should be understood that the essential feature of the invention is the sliding door with the measuring pocket and that the above described mechanism for operating the door may be varied to suit particular requirements.

Dated this 14th day of May, 1923.

SEFTON-JONES, O'DELL & STEPHENS,
Chartered Patent Agents,
285, High Holborn, London, W.C. 1,
Agents for the Applicants.

COMPLETE SPECIFICATION.

Improvements in and relating to Apparatus for Delivering Measured Quantities by Volumes of Pulverulent and other Solid Materials.

We, ARTHUR SAMUEL LEGG, of the "Pond" Engineering Works, Willett Road, Thornton Heath, Surrey, and ALBERT PRIME, of 70, Lakehall Road, Thornton Heath, Surrey, both subjects of the King of Great Britain and Ireland, do hereby declare the nature of this invention and in what manner the same is to be performed, to be particularly described and ascertained in and by the following statement:—

The present invention relates to appa-

ratus for measuring and delivering quantities of powder. It is common practice to employ powder delivering apparatus operated from a water delivering and measuring vessel of the tipping or rocking type, lost motion being allowed in the connection between the water delivering apparatus and the powder delivering apparatus, so that the tipping vessel is allowed to acquire sufficient power to operate the powder delivering mechanism In the above described apparatus, the powder is delivered by a rotating disc having bent radial projections, the disc being arranged at the bottom of a tapering canister and the delivery taking place through suitable apertures in the side of the canister. A stirrer to prevent caking of the powder is attached to the disc.

It has also been suggested to employ a sliding door having therein a pair of measuring pockets, one or other of said pockets registering normally with the outlet from the powder reservoir and adapted to be moved alternately into register with a delivery orifice by the action of the tipping vessel.

In another form of single pocket slide it has been proposed to adjust the size of the pocket by employing a sliding wall actuated by a thumb screw.

The present invention comprises apparatus of the kind adapted to deliver measured quantities of pulverulent and other solid materials having a door provided with a slot therethrough forming the pocket sliding within a box and operated by the action of the tipping vessel, in which the sliding door is carried on a pair of co-axial guide rods, and a partition is slidable within said pocket slot and adjusted by a screw mounted concentrically within one of the guide rods, said adjustable door being combined with a series of cone-pieces adapted to fit into the delivery opening of the powder reservoir, the cone-pieces having openings corresponding with various sizes of door.

A stirrer is provided, driven from the tipping vessel by a pawl and ratchet mechanism or other suitable means, lost motion being provided to allow the tipping vessel to acquire sufficient power before operating the stirrer. Lost motion may also be provided for the same reason in the means for operating the sliding door.

The measuring pocket is preferably made adjustable in size and the sliding door is conveniently operated by a linkage from the trunnion shaft of the tipping vessel.

Examples of construction according to the invention are shown in the accompanying drawings, in which—

Figure 1 is a side view, partly in section, of the complete mechanism.

Figure 2 is a view taken from below of the mechanism shown in Figure 1, and

Figure 3 is a sectional side view of the mechanism for use with double tipping vessels.

Referring now to Figures 1 and 2, the powder is contained in a canister 1 of substantially conical form and is delivered by means of a sliding door 2 provided with a slot 3 passing right through it so as to form a measuring pocket. The door slides in a box 4 formed in a base casting 5 secured to the canister 1. It is guided by a pair of rods 6, 7, working in bearings 8, 9, on the base 5. If it is desired to vary the quantity measured by the door 2, the slot 3 is provided with a sliding partition 10 adjusted by a screw 11 which passes through the rod 6 which is made hollow for this purpose. A locknut 12 is provided for security. The partition 10 is provided with a cover plate 13 which prevents powder from falling into the space behind it, and the door 2 is provided with a plate 14 which closes the opening of the canister when the door is moved over to the position of delivery. The opening of the canister is provided with a removable cone-piece 15. A door covering the range of delivery required is fitted and the cone-piece 15 is of corresponding size. The canister is provided with a stirrer 16 operated through bevel wheels 17 from a ratchet wheel 18. The bevel wheels are enclosed in a casing to protect them from the powder.

Both the stirrer 16 and the door 2 are operated by the tipping vessel from its trunnion shaft 19. This shaft is fitted with a crank arm 20 which operates through a link 21 an arm 22 on a shaft 23 carried in bearings on the base 5. The door is moved by crank arms 24 and connecting rods 25 pivoted to the rod 7. To prevent side thrust, the arms 24 and connecting rods 25 are arranged on either side of the rod 7 as shown in Figure 2, the connecting rods 25 being pivoted to a cross-piece 26 on the rod 7.

The stirrer is operated from a second crank arm 27 on the shaft 19, through a link 28 pivoted to a radial arm 29 carrying a pawl 30 working on the ratchet wheel 18. Since considerable resistance may be offered to the stirrer owing to packing of the powder, the tipping vessel must be allowed to gather power before operating the stirrer as otherwise too much water will be measured out, or

it may not hold sufficient water to provide power to operate the stirrer. To permit the vessel to acquire the necessary power, lost motion is allowed in the stirrer operating mechanism. This may comprise a slot 31 in the link 28, but by designing the parts so that the stroke of the pawl 30 is almost sufficient to pass over two teeth of the ratchet wheel 18 sufficient lost motion will be allowed at this point and the slot 31 can be omitted. This is preferable since the slot 31 is a bad feature mechanically. Lost motion may be provided if desired in the door operating mechanism, but this is not essential since the door does not pass through the bulk of the powder and the friction is very small. If it is preferred to provide lost motion, however, this may conveniently be done by slotting any of the horizontally moving members of the linkage operating the door.

The whole mechanism works in the following manner. The canister is mounted adjacent to the tipping vessel over the vessel into which delivery takes place. The measuring pocket is adjusted to the required size and the corresponding cone-piece 15 inserted and the canister filled with powder, the pocket in the door immediately filling.

As soon as the tipping vessel operates, the door is moved to the left and the contents of the pocket fall into the delivery vessel through a hole 32 in the bottom of the box 4. During the displacement of the door the opening in the canister is closed by the plate 14 so that no powder falls out. Some time after the commencement of the tipping when the vessel has acquired sufficient power, the stirrer is operated so that the powder is loosened sufficiently to fill the pocket when the door is returned by the recovery of the tipping vessel after emptying.

In a modified construction according to the invention, the door is operated by a cam, arranged to work vertically by means of a crank arm on the gudgeon of the tipping vessel and a connecting rod. The door guide rod is provided with a suitable follower which abuts against the working face or edge of the cam which is inclined to the vertical so that when the cam is operated the door is pushed over. The rod is kept against the cam and the door returned by means of a spring. Lost motion may be provided by suitably shaping the cam.

Powder delivering machines of this type are sometimes provided with a double tipping vessel. In this case a single door having two pockets as shown in Figure 3 may be used. In this case the door 2 is provided with two pockets 32, 33, which fill and empty alternately through the openings 34, 35, mechanism comprising a crank arm 36, a link 37, a lever 38 and a connecting rod 39 being provided so that the door moves in one direction when one tipping vessel acts and in the opposite direction when the other vessel acts. Stirring mechanism is provided as before and lost motion is left for the same reason. The pockets may further be adjustable by means of a similar construction to that described above, a single screw passing into both pockets, or an independent screw being provided for each pocket and operated from opposite ends of the guide rods.

It will be understood that one tipping vessel may be adapted to operate two or more doors on separate canisters, such as are used when a number of different powders are to be added to the water, or any other substance or materials.

Having now particularly described and ascertained the nature of our said invention and in what manner the same is to be performed, we declare that what we claim is:—

1. Apparatus of the kind adapted to deliver measured quantities of pulverulent and other solid materials having a door provided with a slot therethrough forming the pocket sliding within a box and operated by the action of the tipping vessel, in which the sliding door is carried on a pair of co-axial guide rods, and a partition is slidable within said pocket slot, and adjusted by a screw mounted concentrically within one of the guide rods, said adjustable door being combined with a series of cone-pieces adapted to fit into the delivery opening of the powder reservoir, the cone-pieces having openings corresponding with various sizes of door.

2. Apparatus as claimed in Claim 1, in which the door is operated from the trunnion shaft of the tipping vessel by means of a linkage connected to one of the guide rods, the parts thereof attached to the guide rod being in duplicate on opposite sides of the guide rod so that side thrust is eliminated.

3. Apparatus as claimed in Claim 1, in which the door is operated by a vertical cam against which a follower on one of the guide rods abuts, the cam being reciprocated by a linkage from the trunnion shaft of the tipping vessel.

4. Apparatus as claimed in any of the preceding claims, in which lost motion is provided in the door operating mechanism so that a surplus of power is acquired by the tipping vesel before the door is operated.

5. In combination with apparatus as claimed in any of the preceding claims, a stirring mechanism having lost motion therein so that sufficient power is acquired by the tipping vessel to operate the stirrer even when the powder is caked and offers a high resistance.

6. The apparatus substantially as described with reference to the accompanying drawings.

Dated this 13th day of February, 1924.

SEFTON-JONES, O'DELL & STEPHENS,
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Agents for the Applicants.

Redhill: Printed for His Majesty's Stationery Office, by Love & Malcomson, Ltd.—1924.

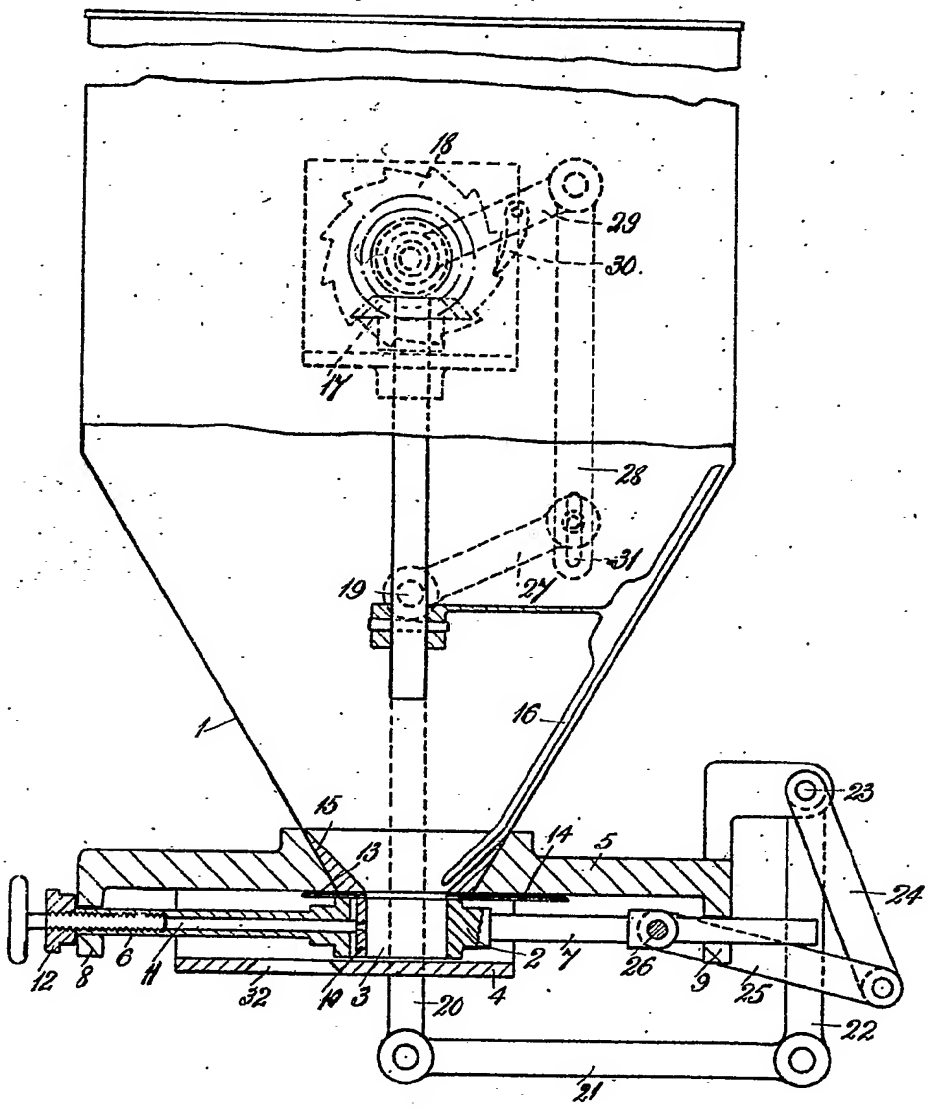


Fig. 1.

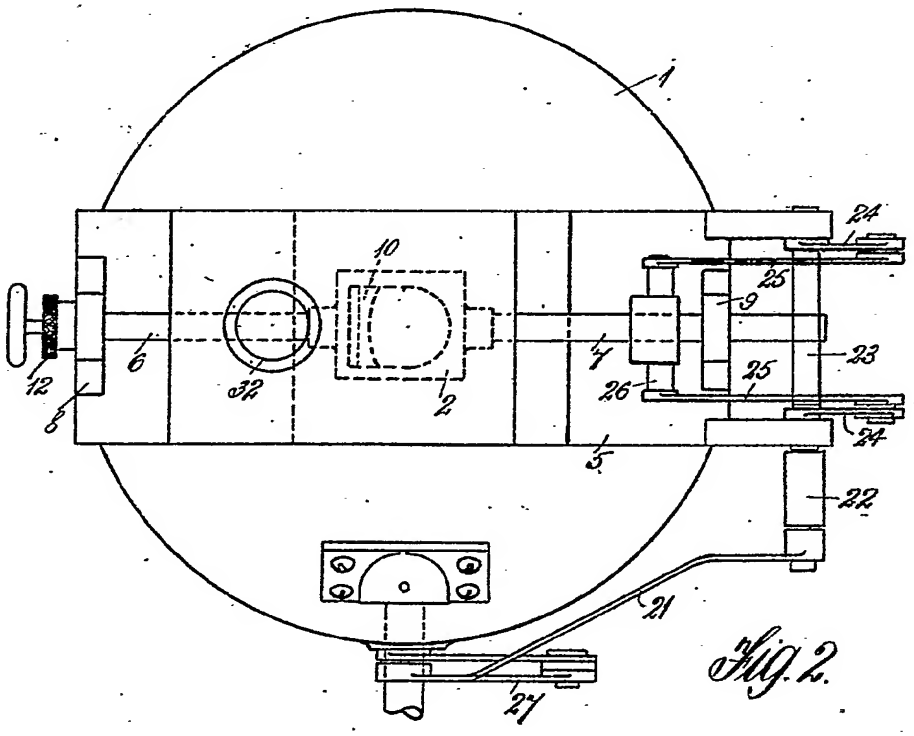


Fig. 2.

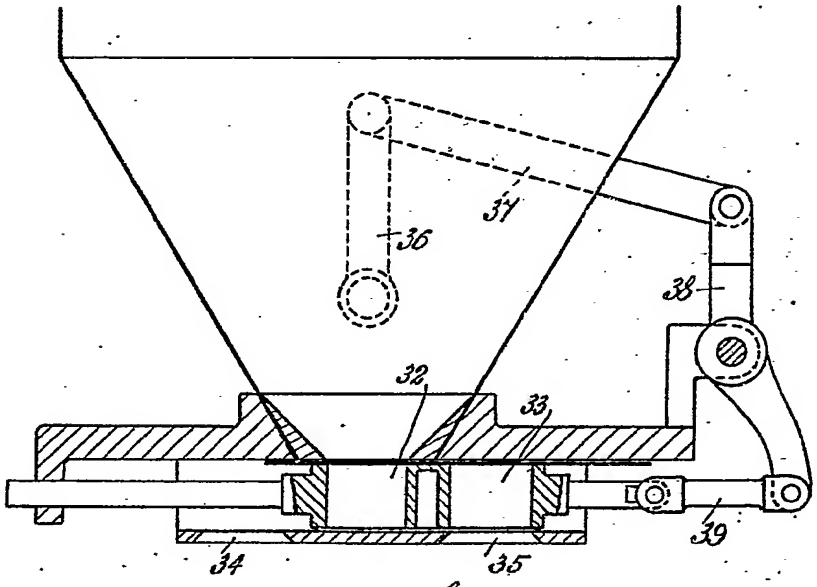


Fig. 3.

Malby & Sons, Photo-Litho

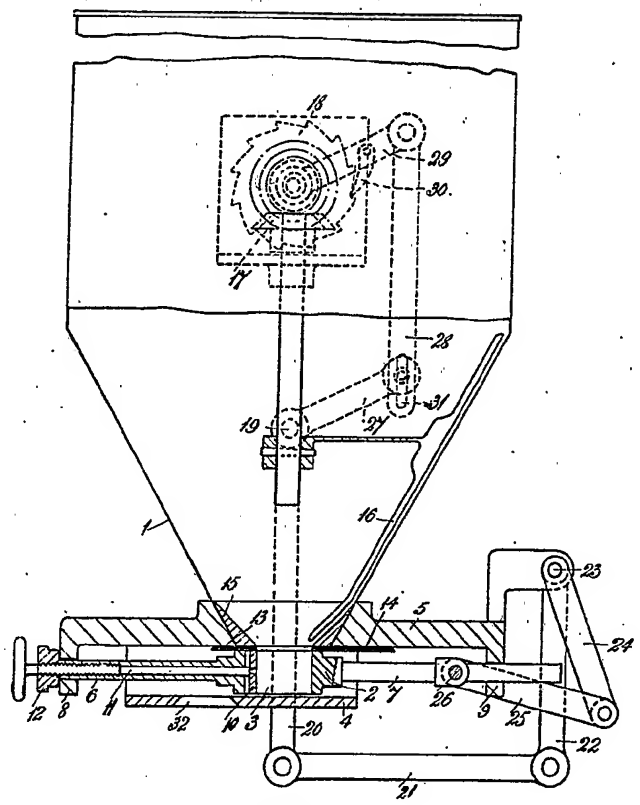
215,577 COMPLETE SPECIFICATION

2 SHEETS

SHEET 1

SHEET 2

[This Drawing is a reproduction of the Original on a reduced scale]



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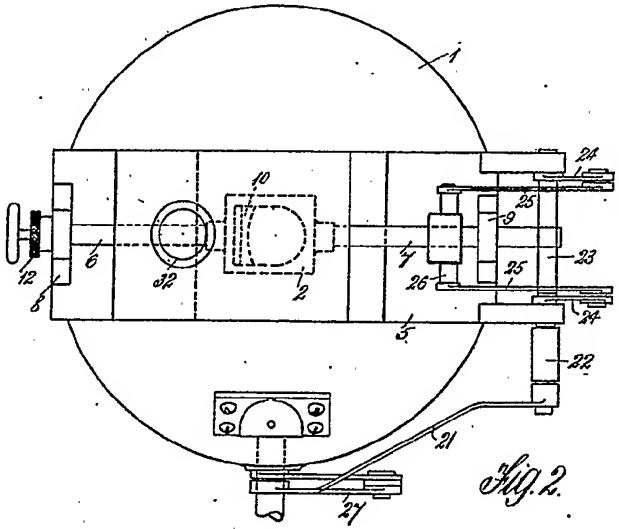
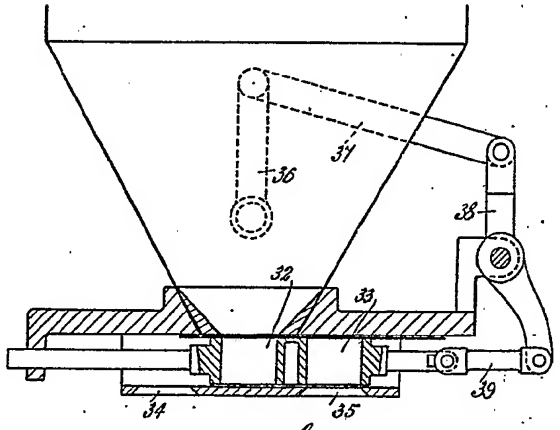


Fig. 2.



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Malby & Sons, Photo-Litho